

GRACE: A NEW MISSION CONCEPT FOR HIGH RESOLUTION GRAVITY FIELD MAPPING

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A low-cost mission concept, the Gravity Recovery and Characterization Experiment (GRACE), based upon microwave phase tracking between two small, low-Earth orbiting spacecraft, has been developed at JPL. The goal of the mission is to provide knowledge of the earth's gravity field consistent with centimeter level geoid accuracy to a resolution of at least 150 km. Such a gravity model would have significant applications for navigation, oceanography, and solid Earth science. The currently proposed configuration provides ranging between the two spacecraft to better than 10 micrometers (in IO-see. normal points) for separation distances up to 1000 km. In addition, GE'S receivers on each spacecraft will allow direct tracking of their trajectories to contribute powerful long and medium wavelength information about the gravity field. Optional limb-viewing antennas would also allow GPS occultation studies of the earth's atmosphere for meteorological purposes. A study of the hardware feasibility and a detailed simulation of the expected errors in the estimated geopotential and geoid have been performed. Results suggest that recent advances in microsat technology, coupled with the use of many off-the-shelf components, should enable the GRACE mission to provide a highly accurate model for the earth's gravity field at a comparatively low cost.

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